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THE FORESTS OF NEW HAMPSHIRE.

AN ADDRESS

BEFORE THE

New Hampshire Fish and Game League,

DELIVERED AT THEIR

ANNUAL MEETING AT MANCHESTER,

APRIL 5, 1883.

BY JOSEPH B. WALKER,

OF CONCORD.

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THE FORESTS OF NEW HAMPSHIRE.

PRESENT CONDITION OF OUR FORESTS.

When our English ancestors made their first settlement upon the eastern borders of this state, it was everywhere covered with a dense forest. This, interrupted only by the water's surfaces, with which we are all familiar, and a few mountain summits above the line of arboreal vegetation, extended everywhere—from the Piscataqua to the Connecticut, and from the mouth of the Merrimack to Indian Stream. For generations which we cannot number, as they kept no records, it had been the heritage of the red men, and in their possession. Living and dying in its shadows, they never wasted it, or diminished its area.

But the white man, unlike the Indian, could not live in the woods. The civilization which he brought to his new home required sunlight and an uncovered soil. As a consequence the forest began, immediately upon his advent, to recede from Strawberry Bank and Dover Point, and subsequently, as population advanced inward, the woods gave place to other clearings, which have been enlarging ever since.*

*The following sketch of the first period of lumbering in New Hampshire, by Joseph Barnard, Esq., of Hopkinton, published a few months since in the *Concord Monitor*, is interesting as a graphic sketch of early denudation in this state:

“Before American independence, the king of Great Britain sent his agents through this state, who marked a large number of trees of sufficient size to make masts for 74-gun ships of war, with the broad arrow (thus, A) cut deep into the bark, about four feet in length. No one was allowed to meddle with the marked trees under a heavy penalty. There were two in the mast swamp in Boscawen, and one on the farm of the late Isaiah Webber, in this town. One of the former and the latter were cut before the Revolutionary war. It was said by old people that a pair of six-foot cattle could be turned on the stump without stepping off, of the one cut in the mast swamp. It took twenty-five yoke of oxen to draw the mast to the river. The other one had the top broken

In the absence of authoritative statistics, it is impossible to state with accuracy our present forest area. Careful observers, whose attention has been called to the subject, think that about forty per cent. of the state's surface is at this time covered with woods; that of this portion one fourth is of primeval growth, and three fourths of growths more recent, varying in age from that of the sprouts of a single season to the mature trees of a generation. In other words, we have yet in New Hampshire

off by the wind, and was hollow. It was about sixty feet high, and a fine specimen of the old pine. A few years ago it was cut by some coon hunters. It was about five feet in diameter twelve feet from the ground, and was always known as the 'King' tree.

"During the early period of settlements, masts were taken from this section of the state to the seaport. Large numbers were taken from the mast swamp above mentioned, and were drawn to the mast-yard on the bank of the Contoocook river, near the Mast Yard station on the Concord & Claremont Railroad: hence its name. A large number of men came up winters from the lower towns, and built log-camps for themselves and ox-teams. Within my remembrance the spot was plainly marked where these camps had rotted down, and the old pine stump was still there in the centre of the men's camp, with the top scooped out for the barrel of rum to set in.

"Soon after this saw-mills were erected on the small streams in different parts of the town to saw lumber to build farm buildings, and sell to the village people to build up the villages. These mills had the up-and-down saw, which would cut about 2,000 feet a day. I find, by my grandfather's old mill account, dating a hundred years back, that boards were sawed at his mill, and drawn by ox-teams from here to Garvin's falls. One of the first settlers drove mill-logs for several years from two miles above Contoocook to Newburyport, and gained a good property by the operation. The early settlers employed more help than we do at the present time. After harvesting was over, the surplus help went to the woods, and worked in the winter months, splitting and shaving short and long shingles and clapboards from pine trees; also, white oak, ash, and chestnut into barrel-staves and headings, and red oak into shook-staves. Others cut, split, and shaved hoop-poles. Most of these men were experts in the business. Those who made shingles were called shingle-weavers. They would frequently box into a tree, and take out a large chip: if it proved to be cross-grained, or winding, it was rejected. I have cut many of these rejected trees in lumbering. I once saw one of these shingle-weavers at work, splitting his shingles so near the pattern that they needed but very little shaving. The shingles were bound together by split pieces of wood, called binders, 900 in a bunch. The clapboards were tied in bunches of 25 with withies. In this way they were transported to market by ox-teams, and exchanged for such goods as were wanted by the farmers, sometimes receiving part money for pay. The white oak, ash, and chestnut staves were mostly worked into barrels by coopers in different parts of the town. The shook-staves were shaved into shape, and set up with truss hoops in the shape of a hogshead, and heated until they were bent into proper shape; then knocked down, and each packed in a bundle, not unlike the clapboards. The barrels and shook-staves were carted by ox-teams to the cities, the barrels to be filled with rum, beef, pork, etc., and the shook-staves were exported to the West Indies and other parts, set up, headed, and filled with molasses. Large quantities of hard pine were cut and burned into charcoal for blacksmiths' use and other purposes. This brings us down to the second period of lumbering in this state. During these years was the flax-growing period among the farmers."

Masting was not uncommon in New Hampshire an hundred years ago. It was carried on under a "mast-master," who selected the trees to be cut, how they were to be felled, and how trimmed and loaded for removal from the forest. In some instances

some two and one third millions (2,375,680) of acres of forest area. Upon this the trees are irregularly distributed, just as neglect or a reckless management may have left them.

It is probable, almost to a certainty, that our wooded areas have increased rather than diminished during the last twenty-five years. But this increase, if such there is, comes rather from the abandonment to nature of worn-out fields and pastures, whose culture was no longer profitable, than from any particular desire to enlarge our forests. Our primeval woods and others of mature age have been diminished in this period, and, although our fuel supply may possibly have held its own, that of our timber has been very largely reduced. We have already reached a point where large quantities of the best timber we use are necessarily imported from the West, or from Canada. But for new and increasing facilities of transportation, we should now be suffering from a timber famine, of much inconvenience, to say the least.

Yet our forests are still of great value, and with proper care will maintain their productiveness, and yield reliable returns indefinitely. If we examine them, we shall find their woods of excellent quality and in large variety. It is easy to enumerate

their conveyance to the river, down which they were floated to their destination, required not less than forty yoke of oxen, and a corresponding number of teamsters and "tailmen." The duty of the latter was to pull by their tails the rear oxen from under the forward end of the mast, when, upon crossing a sharp elevation, it pitched suddenly downwards, and would strike them unless pulled aside. During this part of the work the mast-master was on horseback, and gave it superintendence all along the line.

Tradition tells us of an immense mast, for which the mast-master was to receive one thousand dollars when delivered in good condition at Newburyport. It was safely drawn from the woods, and launched from the bank of the Contoocook. It passed safely over the Fisherville falls, as well as all below on the Merrimack as far as those of Amoskeag. Here it floated directly across the rapids, while its ends struck the rocks upon the opposite shores. Here it lay immovable, breasting the whole volume of the river. In these days it would be an easy matter to dislodge such a stick. The most feasible means to do this, then thought, was to shoot down the current against it another large log to strike against and dislodge it. The first sent down passed over it. The second passed underneath it. The third struck it, and broke it in two. When the mast-master saw what had been done, he simply remarked that he was a ruined man; rode into the woods, and disappeared forever after.

In his diary for the year 1764, the Rev. Timothy Walker, of Concord, remarks as follows, viz.,—

"Mon. Jan. 9. Ye mast team set out."

"Tues. Jan. 17. At night Prince with one yoke of oxen went into the mast camp."

"Wed. Jan. 18. Mr. Webster hauled his great mast at night."

from memory more than forty, and still leave the list incomplete.

We have not less than five species of oak, viz.,—

1. *White oak* (*Quercus alba*).
2. *Chestnut oak* (*Q. castanea*).
3. *Scarlet oak* (*Q. coccinea*).
4. *Black oak* (*Q. tinctoria*).
5. *Red oak* (*Q. rubra*).

Compared with the western oaks, ours are heavier and tougher. Where strength is required, they are of greater value. No oak, if we except the live oak of the South, is stronger, or of greater specific gravity, than our white oak. Where strength and stiffness are the qualities sought, I know of no varieties grown elsewhere which excel our red oak.

Our forests give us two species of ash of great excellence, viz.,—

6. *White ash* (*Fraxinus acuminata*).
7. *Brown ash* (*F. sambucifolia*).

No timber combines the three qualities of lightness, strength, and stiffness in equal degree with our white ash. The supply of this has been of great importance in carriage manufacturing, long an important industry in some localities of our state.

They also give us four kinds of birch, viz.,—

8. *Black birch* (*Betula lenta*).
9. *Yellow birch* (*B. excelsa*).
10. *White birch* (*B. populifolia*).
11. *Canoe birch* (*B. papyracea*).

For some years past birch has been largely used in the manufacture of furniture, house finishings, and many smaller articles. The piles of it annually used in the manufacture of bedsteads at our state prison are immense.

We have two varieties of elm, viz.,—

12. *White elm* (*Ulmus Americana*).
13. *Slippery elm* (*U. fulva*).

The latter of these is not very common. The first is more so, and in open grounds makes the finest shade-tree we have, living to a great age and attaining to a great size. Five elms upon Main street in Concord, set out in 1764, by the Rev. Timothy

Walker, have the following circumferences at three feet from the ground, viz.,—

The 1st, sixteen feet and nine inches.

The 2d, fourteen feet and eight inches.

The 3d, nine feet and seven inches.

The 4th, thirteen feet and seven inches.

The 5th, fourteen feet and four inches.*

In carriage-building elm wood is important, as affording the best material for wheel-hubs of any in general use.

Four kinds of maple, all attaining to good size, may be found in our woods, viz.,—

14. *Rock maple* (*Acer saccharinum*).

15. *White maple* (*A. criocarpum*).

16. *Red maple* (*A. rubrum*), and

17. *Black sugar maple* (*A. nigrum*).

The first of these has a value universally appreciated, and its range of uses is both large and important. The richness of its sap in saccharine properties makes it valuable as a sugar-producing tree.

Our woods afford us but one variety of

18. *Chestnut* (*Castanea vesca*).

The wood of this tree, formerly but lightly esteemed, has grown in value as its fitness for specific uses has been discovered. It long resists decay when exposed to moisture, and is largely used for railroad ties, fence posts, furniture, and to some extent for house finishing.

Nor have we more than a single species of the following, viz.,—

19. *Beech* (*Fagus sylvatica*).

20. *Tupelo* (*Nyssa aquatica*), a hard and heavy wood but little esteemed, particularly for fuel, the interlacing of its fibres rendering it very hard to split.

21. *Lever wood* (*Ostrya Virginica*).

22. *Horn-beam* (*Carpinus Americana*).

* The sizes of these trees in 1853 were as follows, viz.,—The 1st, sixteen feet; the 2d, twelve feet and nine inches; the 3d, nine feet; the 4th, thirteen feet; the 5th, twelve feet and nine inches.

Comparing these dimensions with those given in the text above, it will be seen that the aggregate gain in circumference of these five elms during the last thirty years has been five feet and five inches. They are still, at one hundred and nineteen years from their planting, vigorous old Nestors, and promise a good record for the next thirty years.

- 23. *Black alder* (*Alnus incana*).
- 24. *Mountain ash* (*Pyrus Americana*).
- 25. *Butternut* (*Juglans cinerea*).
- 26. *Mulberry* (*Morus alba*).
- 27. *Buttonwood* (*Platanus occidentalis*).

28. *Poplar* (*Populus tremuloides*), which, but little esteemed formerly, has of late been much used in the manufacture of excelsior and paper stock. Its rapid growth and the immense consumption of paper, all the while increasing, has raised it to a rank of much importance.

29. *Basswood* (*Tilia Americana*). The wood of this tree, combining as it does the qualities of lightness, closeness of grain, and strength, is of great value in carriage-building, and to some extent in carpentry.

We have two species of walnut, viz.,—

- 30. *Shell-bark hickory* (*Carya alba*).
- 31. *Pig-nut hickory* (*C. porcina*).

The first of these stands at the head of all American woods as a fuel, and was made by Marcus Bull his standard of comparison in his experiments upon the relative heating values of different woods. Its solidity of texture and its strength render it a wood of great value in the arts.

We have also but one variety each of the

- 32. *Hackmatack* (*Larix Americana*).
- 33. *Hemlock* (*Abies Canadensis*).
- 34. *Balsam fir* (*A. balsamea*).
- 35. *Black spruce* (*A. nigra*).
- 36. *White spruce* (*A. alba*).

The four last of these are evergreens, and furnish a large portion of our building timber.

Our forests yield us two valuable species of cherry, viz.,—

- 37. *Wild red cherry* (*Prunus Pennsylvanica*), and
- 38. *Wild black cherry* (*P. serotina*); and three species of pine, viz.,—

- 39. *White pine* (*Pinus strobus*).
- 40. *Pitch pine* (*P. rigida*).
- 41. *Norway pine* (*P. resinosa*).

We also find in them the

- 42. *Arbor vitæ* (*Thuja occidentalis*).

The varieties of trees thus far enumerated amount to forty-two. I have purposely omitted many, as the *willow*, of which we have at least sixteen distinct species, the *Balm of Gilead*, the *Lombardy poplar*, the *striped maple*, the *scrub oak*, etc., being of less value on account of size or quality of wood. ' This list might easily be extended, but is amply sufficient to show clearly the great value of our forests.*

Some of these trees are pretty strictly confined to particular localities : some are scattered over all parts of the state. If we run a line from Hanover eastward to the north end of Winnipiseogee lake, and thence north-easterly so as to strike the upper edge of the sand plains about Madison and Conway, we shall divide the state into two tolerably equal parts, the northern having a little higher latitude and a considerably higher altitude than the southern. Each, upon examination, will be found to possess a flora differing considerably from that of the other.

In the northern half, we shall find predominating the spruces, the arbor vitæ, the rock maple, and the beech ; in the southern, the oaks, the elms, the river maple, and the walnut are common, and give character to the forests. The chestnut very rarely, if ever, grows in the northern section, and is found only in localities of limited extent in the southern. The pitch pine is confined mostly to the sand plains. The white pine, however, grows at almost any moderate altitude, and in any latitude within our limits, generally following the river valleys and adjoining slopes all the way from the Massachusetts line to Canada.

But the timber trees of our forests are, unfortunately, unevenly distributed over the surface they occupy. Fires, reckless cuttings, and neglect have rendered many of the growths very uneven. While some acres would yield twenty-five thousand feet, or very much more, others adjoining will afford less than five. Artificial planting has never been practised in New Hampshire, and our woods consequently are composed of chance varieties of trees indiscriminately mingled by natural seedings. The advantages incident to a regular disposition of specific

* More or less confusion exists in the books as to the true scientific names of some of the trees of this list, but it is hoped that those given above may be correct, having been carefully examined and revised by Mr. Moses Woolson, of Concord, one of the best arboreal botanists in New England.

varieties of trees upon timbered acres have never yet been enjoyed, and but rarely even dreamed of, in New Hampshire.

OUR FOREST MANAGEMENT.

The management of our forests, or rather their treatment, for I cannot conscientiously use the word management in this connection, has been by no means uniform. It has been governed a good deal by the capricious notions of their owners, sometimes by the nature of their growths, and at other times by their location. Present profit has been the governing consideration in its determination.

In the older parts of the state, where wood and timber are most valuable, it is a common practice to remove from time to time old and decaying trees, and often with such care as to save from injury the surrounding growth. A forest thus treated for a long period improves but little, and yields but a meagre income.

Some owners have been induced at times, by offers of timber contractors, which they deemed tempting, to allow the removal of trees of specific kinds and dimensions scattered throughout their forests. The opening of roads for this purpose necessitates, of course, the destruction of many others, for which the owner receives insufficient compensation. Such a practice increases greatly the unevenness of growth common to natural forests, and is as injurious as it is stupid.

In the primeval forests of the northern part of the state, where stumpage is cheap and lumbering operations extensive, it is often the custom to remove those trees only which are above an established minimum size, reserving for future cuttings all below it. This is frequently fixed at eight or nine inches of diameter at the ground. Such a practice allows subsequent cuttings at intervals of twenty years or thereabouts. The considerations in support of it are the remoteness of forests, the high expense of transportation, and the slight value of small timber. Those against it are the destruction of much young growth by the opening of roads, the cumbering of the ground with large quantities of *débris* which become dangerous in case of fire, and the creation of vacant spots upon the lot.

A prominent lumberman in the northern part of the state remarked to me a short time since that he thought it wise to cut no trees of a butt diameter less than twelve inches, and that with

some addition to his present forests he could cut perpetually all the lumber he cared to market, as the new growth would keep pace with that removed. What kind of landed estate can be more desirable than this, where unaided nature supplies the crop, and only asks its removal that it may give place for a new one?

We occasionally find coppice woods in the lower part of the state, particularly in the vicinity of large towns where wood is in demand and brings good prices. Under this treatment the entire growth is removed by clean cuttings at intervals of from twenty to forty years. Such forests produce only small timber and wood. But the demand for the former, which has arisen in later years, renders its culture profitable. Indeed, it would be difficult to mention a better paying timber crop than one of white pine, which is of rapid growth, and always in active demand for the manufacture of pails, tubs, kits, casks, boxes, etc.

In very rare instances, if at all, do we find persons intelligently engaged in the systematic culture of large timber. The most valuable trees of our forests require for the attainment of full maturity a period of from sixty to a hundred years, according to the variety of tree, soil, and exposure.*

* Eighty-five logs, cut some years since in and about Concord, were found upon careful examination to have the following butt diameters, numbers of annual rings, and average increase of butt diameters per annum, viz.:

FORTY WHITE PINE LOGS.

Di- ameters.	No. rings.	Average annual increase.	Di- ameters.	No. rings.	Average annual increase.
19 inches	75	.25 inch per annum.	425	1,713	5.00
22 "	72	.30 "	35 inches	92	.38 inch per annum
24 "	73	.33 "	27 "	91	.40 "
20 "	82	.24 "	30 "	95	.32 "
21 "	83	.27 "	23 "	92	.25 "
19 "	89	.21 "	16 "	96	.17 "
20 "	90	.22 "	23 "	50	.46 "
19 "	89	.24 "	31 "	91	.34 "
14 "	87	.17 "	21 "	54	.40 "
25 "	90	.28 "	30 "	93	.32 "
12 "	80	.15 "	16 "	58	.24 "
22 "	93	.24 "	26 "	80	.30 "
23 "	92	.25 "	25 "	80	.30 "
22 "	91	.24 "	30 "	90	.33 "
23 "	86	.27 "	20 "	91	.22 "
27 "	90	.30 "	20 "	89	.23 "
23 "	94	.24 "	12 "	60	.20 "
30 "	86	.35 "	20 "	86	.21 "
17 "	89	.20 "	18 "	99	.18 "
23 "	91	.25 "	38 "	164	.23 "
			22 "	107	.22 "
425 inches	1,713	5.00	908 inches	3,471	10.60
			Av. di's, 22.70 in.	Av. No. r's, 86.77	Av. annual incr'se, .265 inches.

The genius of our law, and the entire absence of established families, have thus far discouraged enterprises requiring so much time. Such, probably, will continue to be the case, until eventually, in the not very distant future, the scarcity and increased price of lumber, and greatly augmented wealth seeking investment, shall warrant artificial planting. When a knowledge

TWENTY CHESTNUT LOGS.

18 inches	49	.37 inch per annum.	225	762	2.93
16 "	81	.20 "	19 inches	65	.29 inch per annum
20 "	78	.26 "	16 "	70	.23 "
22 "	87	.25 "	20 "	75	.26 "
14 "	91	.26 "	23 "	93	.25 "
29 "	70	.33 "	21 "	77	.27 "
30 "	80	.38 "	17 "	64	.27 "
27 "	70	.38 "	25 "	72	.35 "
20 "	82	.24 "	25 "	71	.36 "
19 "	74	.26 "	14 "	61	.21 "
			23 "	70	.30 "
225 inches	762	2.93	428 inches	1,480	5.72
			Av. di's, 21.40 in.	Av. No. r's, 74	Av. annual incr'se, .286 inches.

TWENTY RED OAK LOGS.

Di-ameters.	No. rings.	Average annual increase.	Di-ameters.	No. rings.	Average annual increase.
36 inches	64	.56 inch per annum.	176	753	2.52
25 "	69	.36 "	13 inches	58	.19 inch per annum
11 "	35	.31 "	26 "	62	.42 "
18 "	115	.16 "	15 "	60	.25 "
16 "	110	.15 "	15 "	79	.19 "
13 "	100	.13 "	18 "	59	.30 "
19 "	65	.29 "	14 "	55	.25 "
11 "	61	.16 "	15 "	80	.19 "
12 "	70	.17 "	36 "	73	.48 "
15 "	64	.23 "	21 "	63	.33 "
			15 "	60	.25 "
176 inches	753	2.52	364 inches	1,402	5.37
			Av. di's, 18 inches.	Av. No. r's, 70	Av. annual incr'se, .27 inch.

FIVE HEMLOCK LOGS.

24 inches	68	.36 inch per annum.	55	195	.85
17 "	74	.23 "	13 inches	53	.24 inch per annum
14 "	53	.26 "	18 "	140	.13 "
					
55 inches	195	.85	86 inches	388	1.22
			Av. di's, 17.20 in.	Av. No. r's, 77.60	Av. annual incr'se, .24 inch.

of the important fact becomes general, that forests thus produced are profitable, they will as surely appear in the United States as they have in England and upon the Continent. Indeed, they are already here, and thousands upon thousands of acres of plantations may be seen in our newer prairie states.

In short, thus far we have had but little intelligent forest management in New Hampshire. The certain spontaneity with which new woods naturally succeed to old ones when removed, together with the moderate prices of lumber which until lately have prevailed, has kept us satisfied with the growth which undirected and unassisted nature has given us. But the rapid lessening of our timber supply must soon bring us to a consideration of settled systems of forest culture similar to those adopted by other peoples whose spontaneous forests had disappeared.

The superiority of systematic planting over the indiscriminate seedings of nature has been demonstrated over and over again by such experiments as those made by successive dukes of Athol during the last hundred years in Scotland. The returns of wood and timber, to say nothing of the improvement of the lands from such plantations, have far exceeded the interest upon the investments. Twenty-five thousand feet of timber per acre is above the average yield of most of our native forests; and that of indiscriminate varieties. Well conducted plantations would easily yield twice that amount in the same time, and that too of the varieties desired. Regular cuttings of mature timber would supplant the indiscriminate slashings at chance times of both ripe and unripe trees.

WASTE OF OUR FORESTS.

The rapid destruction of our forests now in progress is attracting general attention, and exciting well founded apprehensions

It will be seen by the foregoing that the rate of annual growth varies greatly in different trees,—among the pines, from .15 inch to .46 inch; among the chestnuts, from .20 inch to .38 inch; among the red oaks, from .13 inch to .56 inch; among the hemlocks, from .13 inch to .36 inch. My note-book also shows that the rate of growth varies greatly at different periods in the same tree. Two inches in diameter of a tree gave 43 rings at one period of its growth, and 18 rings at another. Eight several inches in diameter of a hemlock gave respectively 10, 11, 13, 12, 16, 15, 16, 26 rings. The observations above recorded show that the chestnuts and the red oaks have grown the most rapidly, while the slowest growing of the four varieties was the hemlock.

of a timber famine at no distant day. Although our wooded area may not be lessening, but rather increasing, the supply of mature timber is diminishing rapidly. This fact is patent in all parts of the state.

Within the recollection of most of us, a common phraseology of the advertisements of farms for sale represented them as "suitably divided into tillage, pasture, and wood land." Every farm had its wood and timber lot. In exceptional cases only was this wanting. Not unfrequently it was of more value than all the rest of the farm, buildings included. But such is no longer the case. Hundreds of farms consist now of their fields and pastures only, having growing wood barely sufficient for the farmer's fire. If, therefore, upon examination of the census returns we find a decline in the value of farm property, we must attribute it in no small degree to the removal of its wood and timber.

The causes of this rapid disappearance of our older and heavier forests are various. Among them we may note,—

1. Their exposure to high taxation. As the lumber supply diminishes and its value increases, a forest which formerly attracted little attention now commands general notice, and is quite sure to receive commendation from the town assessor by an increased valuation. The owner, after remonstrating for a while to no purpose, rights his grievance by the only means in his power,—by the sale to some lumber contractor of nearly or quite all the merchantable timber upon his farm. We cannot say what becomes of the purchase-money, but we all very well know that the impelling motive of the sale was the avoidance of high taxation.

2. The enhanced value of lumber as transportation and manufacturing interests have been developed has induced many owning this kind of property to realize upon their investments. They have argued, and argued truly, that the interest of the money to be realized from the sale of a mature forest, added to the new growth sure to follow its removal, will exceed the value of the growth of the old forest. In such cases it would generally be unwise not to sell.

3. Another cause is the needless destruction every year of considerable areas of wood and timber by fires carelessly and

maliciously kindled, and against which the owner has no sufficient protection. In the sparsely settled parts of the state, particularly upon the mountains, fires thus kindled often burn for weeks, their extinguishment being impracticable.

Woods near our large towns are particularly exposed. Report was made at an agricultural meeting held in this city last January, that a man had been compelled to sell a wood and timber lot, valued at \$13,000, lying within a few miles of the city hall, for the simple reason that he could not protect it from the fires started by tramps and other worthless human vermin which infested its neighborhood, particularly on Sundays. The liability encountered in the vicinity of Manchester, exists to a greater or less degree in the neighborhoods of all our large towns. Unless the same protection be secured to forests as other property in such localities enjoys, they must inevitably soon disappear.

4. The stupid and reckless treatment of forests by their owners, by no means uncommon, has much to do in rendering them less productive than they might and otherwise would be.* The cuttings are very often without system, and wasteful. Vacant spots are made, and the new trees springing up thereon are obliged to struggle as best they can in the shade of the overhanging tops of the surrounding growth. Cattle and sheep are frequently allowed to browse in young woods, notwithstanding the injury done to the young trees exceeds ten times the good accruing to the herds and flocks. Indeed, the practice has been well-nigh universal, of taking from our forests all they have to yield, and of returning to them neither gratitude, culture, nor protection. The greatest kindness accorded them has been that of neglect. The prevailing idea has been that nature made the forests, and that nature should also take care of them.

5. And the state itself, I regret to say, has done her full share in the sad destruction which we all lament, by selling to lumber operators in 1867 the whole body of her very valuable timber lands lying in the three counties of Carroll, Grafton, and

* A circular of one of the leading leather firms in Boston says, in reference to the procuring of hemlock bark partly in Maine and partly over the line in the British Provinces,—“Every tree has to be cut down to get the bark, and hemlock forests can never be replaced. We cut down in 1881 at least fifty thousand hemlock trees that must rot upon the ground.”—*Boston Daily Advertiser*, February 5, 1883, page 8.

Coös, amounting, according to the deeds of conveyance, to one hundred and seventy-two thousand acres, more or less. For how much, do you ask? For the stupendous sum of twenty-five thousand dollars, or fourteen cents and a half an acre, as appears by copies of three deeds of conveyance preserved in the office of the secretary of state.* The only consolation to be derived from this extraordinary transaction is, that the state thereby secured itself against further folly in this direction by the sale of its last forest acre.

It may be interesting to note, in passing, some of the particular agencies now active in the destruction of our forests. The railroads and manufactories of various kinds have for many years been calling for large quantities of wood and lumber. Most of the forests formerly found in their vicinity exist now only in the representative sapling growths which have succeeded them. Already these great consumers find that their supplies

* By the first deed, dated October 17, 1867, for the sum of five hundred dollars the state conveyed "all and singular, the lands belonging to the state of New Hampshire, lying and being within a circular area six miles in diameter, of which the centre is the centre of the Tip-Top House on the summit of Mount Washington, in the county of Coös in said state, and extending three miles in any direction from the centre of said Tip-Top House, all situate in the county of Coös aforesaid, and estimated to be two thousand acres in the whole, more or less, meaning and intending hereby to transfer and assign to said Anrin M. Chase, his heirs and assigns forever, all the right, title, and interest of the state of New Hampshire in and unto any and all lands within the limits of the aforesaid circle, however the same may be located and bounded and whatever the number of acres."

By the second, dated October 27, 1867, for the sum of twenty thousand five hundred dollars it conveyed "all and singular, the lands belonging to said state of New Hampshire, situate and lying within the limits of the town of Pittsburg, in the county of Coös in said state of New Hampshire, however located and bounded, estimated at seventy thousand acres, more or less, excepting and reserving therefrom to each of two actual *bona fide* settlers now supposed to be resident upon said lands, if they or either of them shall prove to be so actually resident thereon, so much of said land as each of said settlers or either of them may have actually improved or inclosed, not exceeding one hundred acres in all to each or either of said actual settlers."

By the third, dated November 5, 1867, for the sum of four thousand dollars it conveyed "all and singular, the lands belonging to the state of New Hampshire, or in which the said state of New Hampshire has or might have any right, title, interest, or claim in any way whatever, situate and lying within the limits of the counties of Grafton, Carroll, and Coös in said state of New Hampshire, however located and bounded, estimated at one hundred thousand acres, more or less, meaning and intending hereby to assign and convey to said Woods and Smith, their heirs and assigns forever, all and singular, the lands in said counties of Grafton, Carroll, and Coös, to which the said state of New Hampshire has or might have any claim or title in any way whatever, excepting and reserving from said grants the arsenal lot in Lancaster in the county of Coös, and any gun-house lot owned by the state in said counties of Grafton, Carroll, and Coös aforesaid."

have receded, and that they are becoming more and more dependent upon the wood lands of other states. The wood annually consumed by the railroads centring at Concord is not less than about seventy thousand cords, to say nothing of the thousands of ties, and the vast amounts of other lumber used in their shops and upon their various buildings and fences. The contractor of the state prison labor is annually converting into bedsteads nearly four millions (3,756,000) of feet. What an entire city like Manchester consumes I have not the means to state, but enough surely to denude thousands of forest acres.

And the foreign demand upon our wood lands is as great, probably, as the domestic—a fact to be greatly deplored, inasmuch as New Hampshire receives for its exported lumber little more than the stumpage, to which is to be sometimes added the saw bill. The millions of logs which float down the Merrimack every spring yield to persons within the state less than one tenth of their ultimate value, the balance of which goes to parties in Maine, Massachusetts, or Connecticut, as the case may be.

I learned at Milan, a few years since, from one of the prominent lumber operators of northern New Hampshire, that Coös county had then standing in its woods about twelve hundred millions of feet of merchantable lumber. This has been since drawn upon at the rate of from seventy-five to one hundred millions per annum. How long at this rate of cutting will the forests of Coös hold out? And how much, when it is gone, will Coös have received for it?

But these large operations, common to our northern forests, are not so entirely destructive as the portable saw-mills now moving all over the state, particularly the lower half of it. The former may be compared to the hail plague in Egypt, as they usually destroy but partially a forest growth, leaving the smaller trees unmolested. But the latter represent most faithfully the succeeding plague of locusts, “very grievous; before which were none such locusts as they, neither after them shall be such.”

When a portable saw-mill locates in a forest, it is liable to consume all the trees around it for a mile or more, every one of them, from

“The mighty oak,
By whose immovable stem one stands and seems
Almost annihilated,”

to the young sapling just rising into vigorous life.

Our Saxon ancestors upon the east coast of England used to put up prayers in their churches for deliverance from the visitations of the Danes. As wisely does it become us to seek deliverance from the very frequent visitations of these portable mills. No less than five of them have been actively at work in Canterbury this very winter, upon the remaining timber lots of that old town. A few years ago one was set up in Concord, within a mile of the state-house, and before its removal to another section it had swept off the entire growth of three hundred and fifty acres, amounting to some seven millions of feet, and left standing hardly a tree of sufficient size for an ordinary goad-stick.

That the valuation of our farm property must diminish under a continuance of such reckless destruction of the forests is as sure as destiny. That our lumber supplies will grow dearer as they grow less, is just as sure. That a timber famine impends in the near future, to be averted only by supplies from abroad at extravagant prices, who can doubt?

USES OF FORESTS.

It may be well that we consider for a few minutes, just here, some of the uses or offices of forests. These are more numerous and more important than is generally supposed.

1. The first sure to occur to us is that of producing the wood and lumber, without which modern civilization would be an impossibility. The ways in which wood is employed in the occupations of daily life are simply innumerable. From the time when, as an infant, he is placed in his willow carriage, all the way on through life until he is lain to his long rest in his wooden casket, the man of our day is in the constant use of this material.

Nor can there be found for it any general substitute. Metals and clay and stone can take its place in but very few instances.

We cannot finish or furnish a house without it. We cannot build a mill without it. Without it we cannot carry on a farm. Without it we can hardly journey upon the highway, and we are surrounded by it whenever we enter a railway car. It makes a part of our daily newspaper, and a part of the pen which records our daily correspondence. Extensive and minute, restricted and infinite, are its uses. To the forests only can we look for a supply of it.

2. In a country like ours, where cold prevails for half the year, and is rendered more severe at times by winds, forest shelter is of great importance. The rays of the sun are but gay deceivers, if their warmth is to be swept away by a strong north-west wind. You have noticed that vegetation languishes upon grounds exposed to it. Farmers object to the fall plowing of such, from a wise fear that more or less of the soil will take to itself wings and fly away.*

The shelter furnished by forests to cleared land is little less important to the latter than is the protection of their stables to our herds and flocks. Where the sides of our valleys are covered with trees, the colder air of the surrounding elevations is partially arrested in its downward flow, to the very welcome mitigation of their temperature. The blizzards, of which we hear much in late years, are of rare occurrence in a wooded country.

3. The presence of woods increases much the rain-fall of a country, particularly in summer, when droughts are apprehended.† When, at this season, rain-bearing clouds float over us from the ocean, the low temperature of the forests and the coolness exhaling therefrom help greatly to condense these into

* A spectator, placed on the famous bell-tower of the cathedral at Antwerp, saw not long since, on the opposite side of the Schelde, only a vast desert plain: now he sees a forest, the limits of which are confounded with the horizon. Let him enter within its shade;—the supposed forest is but a system of regular rows of trees, the oldest of which is not forty years of age. These plantations have ameliorated the climate which had doomed to sterility the soil where they are planted. While the tempest is violently agitating their tops, the air a little below is still, and sands far more barren than the plateau of La Hague have been transformed under their protection to fertile fields."—*Revue des Deux Mondes*, January, 1859.

† A writer in the American Cyclopædia, speaking of the island of St. Thomas, W. I., says, "The surface is elevated and rough, highest in the centre. It was formerly well wooded, but the cutting off of the wood has subjected it to frequent and severe droughts."

grateful showers. Were the same territory denuded, the ground, heated by the sun, would rarefy these masses of vapor, and the blessings with which they came freighted would be lavished elsewhere and beyond.

Nor is this cooling influence restricted to the clouds alone. It tempers the heat in the open grounds adjacent by the exhalation of moisture. To what extent this may be true we need experimentation to determine; but it is confidently asserted that a ton of hay exhales in growing no less than two and a half tons of water. Our idea of what a forest one square mile in extent would do may be vague, but it is also forcible.

4. But the influence of a forest is not confined to an increase of the rain-fall. It retains it for gradual use as needed. Its trees cover the ground with decaying leaves and other *débris*. They fill the soil with their countless roots, thereby opening through all parts of it minute channels for the passage of moisture. It is just here that the rills are born, which develop into brooks, which subsequently uniting make the rivers of a country. In short, the forests of the state are the great reservoirs in which it stores the water supplies upon which its animal and vegetable life depends for refreshment and support. As well might New York part with its Croton river as New Hampshire give up its forests.*

5. Under the forest's protecting tree-tops evaporation is slow, and much of the loss of moisture to which open grounds are subject is saved. Most of the winter's snow which falls upon these disappears by evaporation. The sun and the March winds carry its moisture we know not where. But little of it penetrates the ground hardened into rock by frost, which lasts as long generally as the snow.

In the woods the reverse is the case. The winds and the sun's rays are but little felt. The ground, frozen but slightly

* In his "The Earth as Modified by Human Action," Hon. George P. Marsh says,—
 "It is an almost universal, and, I believe, well founded opinion, that the protection afforded by the forest against the escape of moisture from its soil by superficial flow and evaporation insures the permanence and regularity of natural springs, not only within the limits of the wood, but at some distance beyond its borders, and thus contributes to the supply of an element essential to both vegetable and animal life. As forests are destroyed, the springs which flowed from the woods, and, consequently, the greater water-courses fed by them, diminish both in number and volume."

if at all, thaws early, and the snow melting largely at the bottom descends into the open soil beneath. The bareness of our old pastures upon the hillsides is doubtless less due to soil exhaustion than to the want of moisture. The snows which fall upon them are largely lost by evaporation. The rains which they receive for the most part run down their indurated surfaces, penetrating the soil but slightly. As reservoirs for the storage and for the gradual supply of water, the forests of a country are of incalculable value, and indispensable.

When, two thousand years ago, it was a wooded country, Palestine bore sub-tropical fruits. Its present barrenness and desolation are largely due to its want of forests. Restore these, and its former productiveness will return, and it will become again "a land flowing with milk and honey."

EFFECTS OF DENUDATION.

To one who has observed the several influences of forests upon climate, the consequences of general denudation are as plain as the corollary of a demonstrated proposition.

1. Cut off the forests of New Hampshire, and our winters will become more severe, our springs and autumns more liable to unseasonable frosts, and the heat of mid-summer more intense. From November to May our climate will be arctic. From July to September it will be torrid.*

2. Summer droughts will become chronic. Agriculture will languish for the want of water. In some sections sterility, cheerless and hopeless, will prevail, accompanied often by its twin brother, desolation.† If some more favored portions

* The following well attested instance of a local change of climate is probably to be referred to the influence of the forest as a shelter against cold winds. To supply the extraordinary demand for Italian iron, occasioned by the exclusion of English iron, in the time of Napoleon I, the furnaces of the valley of Bergamo were stimulated to great activity. The ordinary production of charcoal not sufficing to feed the furnaces and the forges, the woods were felled, the copses cut before their time, and the whole economy of the forest was deranged. At Piazzatorre there was such a devastation of the woods, and consequently such an increased severity of climate, that maize no longer ripened. An association, formed for the purpose, effected the restoration of the forest, and maize flourishes again in the fields of Piazzatorre."—*The Earth as Modified by Human Action*, page 164.

† "FORESTS AND MOISTURE. The Manchester *Union* has an interesting article discussing the causes of the present low state of water in our lakes and rivers, and hinting at the results which may be expected to follow. Certainly the present condition

escape this fate, they will owe their good fortune to the presence of mountain elevations, or their nearness to the sea.

3. Cut off our forests, and instead of even flowing streams, we shall have mountain torrents in spring and dry channels in mid-summer. The water-power of New Hampshire will be fearfully reduced, and our great manufacturing establishments will be compelled to look to steam or electricity for motive power. To what extent the water-power of the state has already been diminished from this cause, you, Mr. President, and other gentlemen who are residents of this great industrial metropolis of our state, can best estimate. Many of the smaller streams, more or less of which we all knew in our youth, and which were then of respectable volume the year round, have either dwindled to insignificance, or are absent altogether for nine months out of every twelve.

4. Cut off our forests, and the forty-five thousand farmers of New Hampshire will lose much of the winter occupation they may now enjoy. One prominent reason why farming is less remunerative than it might be must be attributed to the fact that while in most avocations work is constant the year round, in this it is largely confined to the period when the land is free from frost. Secure to each farm a suitable portion of wood

of things is unusual. The present drought is not confined alone to our state, but prevails elsewhere. It is everywhere regarded as temporary and extraordinary, and people expect soon to see it followed by a heavy rain-fall which shall fill the springs and swell the streams to their former size. But while this lack of water is looked upon as something exceptional and out of the ordinary course, it cannot escape our notice that our streams are not as large as formerly. Few men in middle life, who were reared on farms, and went hunting and fishing as farmers' boys are wont to do, can have failed to notice that a marked change has come over the brooks which they knew in their boyhood. They have been surprised when visiting their old playing grounds to find some brooks entirely dry, and others so much smaller than they once knew them. There is a general agreement of opinion in charging this change to the rapid cutting off of our forest growth. When the railroads were first opened into our state, our hills were covered with a heavy growth on which the yearly attacks of the woodman's axe made no perceptible impression. The new growth would fully make amends for that carried away by lumbermen. But this condition of things no longer exists, and immense forests are slaughtered with a rapidity which the natural growth is far from making good. The sources of many mountain springs are uncovered, and dried up by the scorching sun of summer. The moisture is no longer retained as it used to be in thick forests, tempering with its delicious coolness the heat of summer, and inviting showers from clouds which now pass by without one drop of welcome rain. And when the rain does come, it runs away into the brooks instead of being held in the shade of our woods as formerly. This is the theory for the disappearance of brooks and the diminishing volume of water in our rivers."—*Laconia Democrat*.

and timber land, and the exercise of a fair knowledge of forestry, and its owner may have as remunerative occupation in winter as at other seasons of the year, being thereby relieved of the necessity of consuming in four months of idleness the surplus acquired in the remaining eight of activity.

5. Owing in part to its accessibility and in part to its pure air and fine scenery, New Hampshire is becoming more and more a summer resort to the five or six millions of people who can comfortably transfer themselves from their homes to our hillsides and mountains in some twenty-four hours or less. The number of our summer visitors has been steadily increasing for the last forty years, and during the last ten with great rapidity. The proprietor of a mountain hotel remarked in my hearing, a few years since, that he well remembered when the total receipts of all the White Mountain houses were but about twelve thousand dollars a year, but that such had been the increase that they amounted then to about twelve hundred thousand. What our whole state received last year from its summer visitors is, in the absence of reliable statistics, conjectural only; but the number of them coming to us for longer or shorter periods is estimated by the millions, and placed far above the trebled or sextupled population of our state.

Whatever the actual number may have been, these came here for rest, for recreation, for the invigoration of both body and mind. Some sought the seashore, but more the mountains and the quiet nooks of the hill-country. Cool and invigorating air attracted some. Green fields and country roads, clear skies and fine scenery, afforded enjoyment to thousands of them. Many a one, a serene and faithful follower of dear old Izaak Walton of saintly memory, has annually said to his companions, in the language of the apostle Peter, "I go a fishing:" and they, in reply, have said, "We also will go with thee." Many akin to Nimrod have penetrated the woods, and the pursuit of game has been their pastime.

Sweep the forests from our mountains and hills and lakesides and river banks, and the summer sun will blaze upon their parched surfaces with a fervor like that with which it heats unendurably the city pavements from which many of these have fled. Our small streams will disappear; the volumes of our

rivers and the surfaces of our lakes will shrink wofully; the millions which now visit us will stay away; our population will dwindle; and this goodly heritage will become in its most busy season as desolate as the campagna of old Rome, and as unattractive as the Sahara.

One half, doubtless, of our state may be profitably kept in forest. The specific areas should vary, of course, somewhat at different periods, but that much of its surface should be kept continually covered. A cursory survey of the state's topography will show the truth of this remark. We have five great river basins, separated from each other by extensive hill and mountain ranges. Very generally these latter are incapable of profitable cultivation, but will produce trees perpetually. Within these basins are also many rough and barren lands, fit only for wood. Others still there are, which, owing to their situation, it is important to keep covered, as shelter barriers to break the force of high winds and protect the lands in culture or in pasture. If looked at from such a stand-point, one half at least, and probably considerably more, of the surface of New Hampshire will be clearly seen to require a constant forest covering.

PRESERVATION OF OUR FORESTS.

The alarm so generally manifest at the rapid destruction of our forests is not a groundless one. If denudation continues at its present rate for the next twenty years, we shall have no woodlands left worthy the name of forests. This alarm has come none too soon, nor, indeed, too late, if there can be wise and resolute action for their protection and improvement. The important inquiry everywhere heard just now is, What can be done?*

*"PROGRESS ON THE FORESTRY QUESTION. The increasing interest attending the consideration of the question of the best methods of preserving and extending the forests of New England, is indicated by the course of the Vermont legislature in appointing a Forestry Commission, and by the first meeting of the New Hampshire Forestry Commission at Concord on Wednesday. The Vermont commission is instructed to investigate the whole subject of the condition of the forests, and the measures needed for their protection; and the New Hampshire commission has already instituted measures for collecting information relative to the clearing of New Hampshire forests, and the injury caused thereby to the water supply. The inquiries set on foot by these commissions will serve a double purpose, in arousing the public attention to the importance of the interests affected, and in supplying the accurate information

1. The first thing to be done evidently is to obtain accurate information relative to the present extent, condition, and management of our forests. We need to know

Their total area in acres or square miles ;

Their locations ;

The character of the grounds they occupy, as to soils, elevations, exposures, drainage, etc. ;

Of what trees they are composed ;

The relative amounts of young, mature, and primeval growths ;

The quantity of mature wood and timber now standing in the different counties of the state ;

Its annual diminution by cutting, its annual increase by growth, and, as at present drawn upon, how long it will last.

When these inquiries, together with some others of a kindred nature, have been accurately answered, a solid basis of reliable facts will have been established, from which it will be safe to argue towards a solution of the great problem as to what can be done. If any of my remarks hitherto may have appeared to you vague, the fault is due to the want of the more definite information which I have sought for in vain in the authoritative returns to which I have had access.

But these requisite facts can be gathered only by persons qualified for the work, and particularly engaged to do it. They will not be collected and furnished as a labor of love, and those selected to procure them must be fairly compensated. The commission appointed under a joint resolution of the last legislature will doubtless give us much important information ; but it was restricted simply to inquiries as to the extent of the destruction of our forests, the effects of recent denudation upon the rainfall, and the policy of enacting a code of forest laws. Wider inquiries than these are requisite, and must necessarily be made, if made at all, at the expense of the state.* And this the state

which is necessary to effective legislation. The rapid vanishing of New England forests before the axe, or by means of fire, is something the direct consequences of which, as connected with the timber supply, are serious enough. But the indirect consequences upon the soil and the climate and the water supply, although more recondite, are also more disastrous; and it is time that a persistent and well directed effort should be made to retrieve past errors before it is too late."—*Anon.*

* The immense variety, the many and important uses, and the great beauty of our forests, must naturally attract the attention of an observer; and, as the preservation

should assume, not only as a proper one, but as a penance for its sin in getting so humiliatingly cheated in the sales, before mentioned, of its forest lands. Without the main facts pertaining to this great subject, no one can satisfactorily answer the question, What can be done for the preservation and proper management of our forests? or, better, What should be done?

2. One other thing the state can easily and properly do. It can prescribe by law such penalties for the criminal or careless firing of forest lands as will hereafter secure their protection, and make it the special duty of officers therefor appointed to cause prosecution of all offenders under such a statute. Our present laws are entirely inadequate for the protection of our woods in this direction.*

and improvement of the forests in their highest degree are above private effort, require joint action, and must be effected on a large scale,—on a system wisely begun and long continued by the men of one generation for those of the next,—and by the application of science, taste, and skill, not by one but by many men, not in one village or town but in a county and state, it is wise in a government not acting merely for the present, but extending its forethought generously onwards, making its knowledge and wisdom an invested capital for future use, and desiring to do for coming generations what they, when looking back, shall wish it had done,—it is wise, prudent, and patriotic for such a government to order a survey of the forests among its other domains, that the people may know the sources of their wealth and its extent, and learn how to value, enlarge, and enjoy it.—*Emerson's Trees and Shrubs of Massachusetts, page 1.*

* Our forefathers, as early certainly as 1680, and perhaps earlier, took measures to protect forest property, of which the following statutes of 1680, 1708, and 1718, may be cited as proof, viz.,—

“ FIREING WOODS.

23. Whereas many have sustained great damage by indiscreet and untimely firing of the woods, It is ordered that none shall fire ye woods at any time between ye 1st of March and ye latter end of April; and if any shall unnessesarily fire the woods, or not observe this order, damnifie any, he shall make good the damage or be fined 10s. or sett in the stocks.”—*Provincial Papers, Vol. I, page 392.*

“ An Act passed by the General Court or Assembly of Her Majesty's Province of New Hampshire in New England. Begun and held at Portsmouth by adjournment, the Tenth day of May, 1708.

“ An Act for the better preservation of all Mast Trees, or White Pine Trees, withln Her Majesty's Province of New Hampshire.

“ Whereas this Her Majesty's Province of New Hampshire, doth and may prodnee good quantities of White Pine trees, fit and serviceable for the masting of Her Majesty's Royal Navy; being desirons and wltth design to render the said Province as useful as may be to Her Most Sacred Majesty. And whereas Her Majesty, by her commission to John Bridges, Esq., Her Majesty's Surveyor General, for the time being, by themselves, or his or their Deputies, shall mark such of the said trees that now are or hereafter may be fit and proper to be taken for Her Majesty's Navy, and to keep a register of the same, thereby to prevent the destruction of such trees.

3. The improvement of our forests is of as vital interest as the encouragement of our manufactures. These have, in some instances, been exempted from taxation for limited periods, and the establishment of new enterprises has been encouraged thereby. A similar exemption of certain kinds of forests,—of those, for instance, from twenty to forty years of age, just passing from the state of unripe wood to mature timber,—might, upon a full examination of the subject, be found practicable and wise.

“Be it therefore enacted by the Governor, Council, and representatives convened in General Assembly, and by the authority of the same, That no person or persons within Her Majesty’s Province of New Hampshire, shall presume to cut, fell, or destroy any white pine trees, or mast trees, not being the particular property of any private person, above the growth of twenty-four inches diameter at twelve inches from the earth, being fit to make masts for Her Majesty’s Royal Navy, on the penalty or forfeiture of One Hundred Pounds sterling to Her Majesty, her heirs and successors, for every tree so cut, felled, or destroyed, without Her Majesty’s Royal License, or her successors, first had and obtained for the same; which said sum of One Hundred Pounds shall be received by Bill or Plaint by Her Majesty’s Surveyor General, for the time being, or his Deputy or Deputies in any Court of Record within this Her Majesty’s Province, where there shall be no Effoiger, Protection or Wager in Law: Any Law custom or usage to the contrary notwithstanding: one Moiety of the said penalty to be for the support of this Her Majesty’s Government, and the other Moiety to the informer that shall sue for the same.

“And be it further enacted, That no person whatsoever, excepting the Surveyor General, for the time being, his Deputy or other person authorized thereto by warrant under the Surveyor General’s hand, presume to mark any Mast Trees with the broad arrow which is the mark hereby appointed, thereby to deter Her Majesty’s good subjects from getting logs for lumber, or other uses, and to make a property of such trees to themselves, where the lands are common upon the same penalty, as above, to be recovered and divided as is before in this act expressed.”—*Acts and Laws of New Hampshire, 1716, page 30.*

“An Act to prevent trespasses in Cutting down trees upon Land without Fence. (Passed May, 1718.)

“Be it enacted by His Excellency the Governour, Council, and Representatives, convened in General Assembly, and it is hereby enacted by the authority of the same, That whoever shall cut down any tree or trees, without leave from the owner or owners, shall pay to the party damaged twenty shillings, for each tree or more, according to the value of the trees. And the owner shall be accounted those, or such as derive a right from those to whom the land upon which said trees grow, is laid out, and bounded by the layers out of land, chosen in each town, or others legally appointed thereto; unless in such case where the right of timber belongs to one, and the right of land whereon said timber grows belongs to another, and then the damage accruing by such trespasses, shall be paid to him to whom the right of timber belongs.

“And whosoever shall cut down any bound-mark trees, shall pay a fine of forty shillings to His Majesty, his Heirs and successors towards the support of His Majesty’s Government.

“And every Justice of the Peace within this Province shall have power to hear and determine the causes aforesaid. Always provided, that this act, or any thing therein contained shall not be understood to intermeddle with such trees as His Majesty hath been pleased to reserve for Masts, Bowsprits, and Yards, for supply of his Royal Navy.”—*Acts and Laws of New Hampshire, page 65.*

As before remarked, high taxation has made our most valuable forests luxuries in which their owners are feeling more and more that they cannot afford to indulge.

4. There is another thing possible, but attended in its execution with so many practical difficulties that I only suggest without recommending it. It is the purchase, at low and established prices, by the state, of some of the denuded areas recently cut over, to be held and managed hereafter as public forests. Several of the countries of Europe hold and control large forests in the interest of the common weal. In some sections of the Alpine regions, but for this control the farms would be destroyed by spring torrents, and the lives of the inhabitants endangered by avalanches.

5. But inasmuch as the forests of New Hampshire are, without exception, private property, the state can do little comparatively to govern their management. Its power to legislate in their behalf is limited to the general authority accorded to it in its constitution, and their control rests almost entirely with their owners, upon whose pleasure their welfare is mainly dependent. Any scheme for their amelioration, very much beyond such as I have just indicated, must commend itself to their acceptance, or fail. And, governed almost entirely by imagined pecuniary interests, these will give it no support unless satisfied that it may benefit them in some degree.

If our forests are to be preserved, improved, and made permanently remunerative as investments of money, their owners are the persons to do it. This they may be led to do by a wider knowledge of the influence of forests upon climate, rain-fall, streams, and all adjoining property, as well as of systematic sylvaculture, and of the profits resulting therefrom through skilful removals and renewals of growths at stated periods, by which forest property may be made the safest and most profitable of all country real estate.*

* William Howitt, in his *Rural Life of England*, thus speaks of some of the Scotch plantations:

“ The late Duke of Athol, John the Second, planted in the last year of his life 6,500 acres of mountain ground solely with the larch, which in the course of seventy-two years from the time of planting will be a forest of timber fit for the building of the largest class of ships in her majesty’s navy. It will have been thinned out to about 400 trees per acre. Each tree will contain at least fifty cubic feet, or one load of tim-

In the spread of this information, an able commissioner of forests, supported by the state, should lead the way. His efforts may be very ably supplemented by lectures and discussions at the meetings of the board of agriculture and of the granges. The agricultural college, already doing what it can in this direction, and the public press, to which we are more indebted than to any other agency for awakening public interest upon the subject of our forests, should both be urged to continue their efficient services.* In a word, the future welfare of our forests depends in a measure upon the kind offices of the state, but mainly upon the maintenance of correct views of their value, and proper management by their owners and by an enlightened public.

If their highest welfare can be made permanently secure, all dangers of a timber famine will be averted, the attractions of our scenery will be enhanced, the contracted volumes of our streams will be enlarged, inviting to their cool banks thousands from crowded cities, who, fishermen in their youth, would gladly continue such in their manhood; the woods will be filled with game, and the instincts which we have inherited from our English ancestors may find indulgence in the manly pastimes of the hunt; and New Hampshire, our own gallant little commonwealth, which leads the list of the immortal thirteen which achieved our national independence, and, as the ninth state to ratify its constitution, set in motion the wheels of our general government, will become the most attractive spot this side of Paradise.

ber, which at the low price of one shilling the cubic foot, only one half of its present value, will give £1,000 per acre, or, in all, a sum of £6,500,000 sterling."

"In Argyleshire there are probably 40,000 acres of natural coppice wood, which are cut periodically, commonly every nineteen or twenty years, and are understood to return about £1 an acre annually. Very extensive plantations have been formed by the Duke of Argyle and other proprietors. About thirty years ago those of his grace were reckoned to contain 2,000,000 trees, worth then 4s each, amounting to the enormous sum of £400,000."

*If the legislature, which has wasted hundreds and thousands of dollars in useless talk about crows and woodchucks, would turn its attention to the condition and interests of the forests, and establish a state department of forestry in the agricultural college, it would confer a benefit upon its landed interest far surpassing any as yet rendered it. An annual appropriation, one half as large as that for the support of the fish commission, would amply suffice for its maintenance.